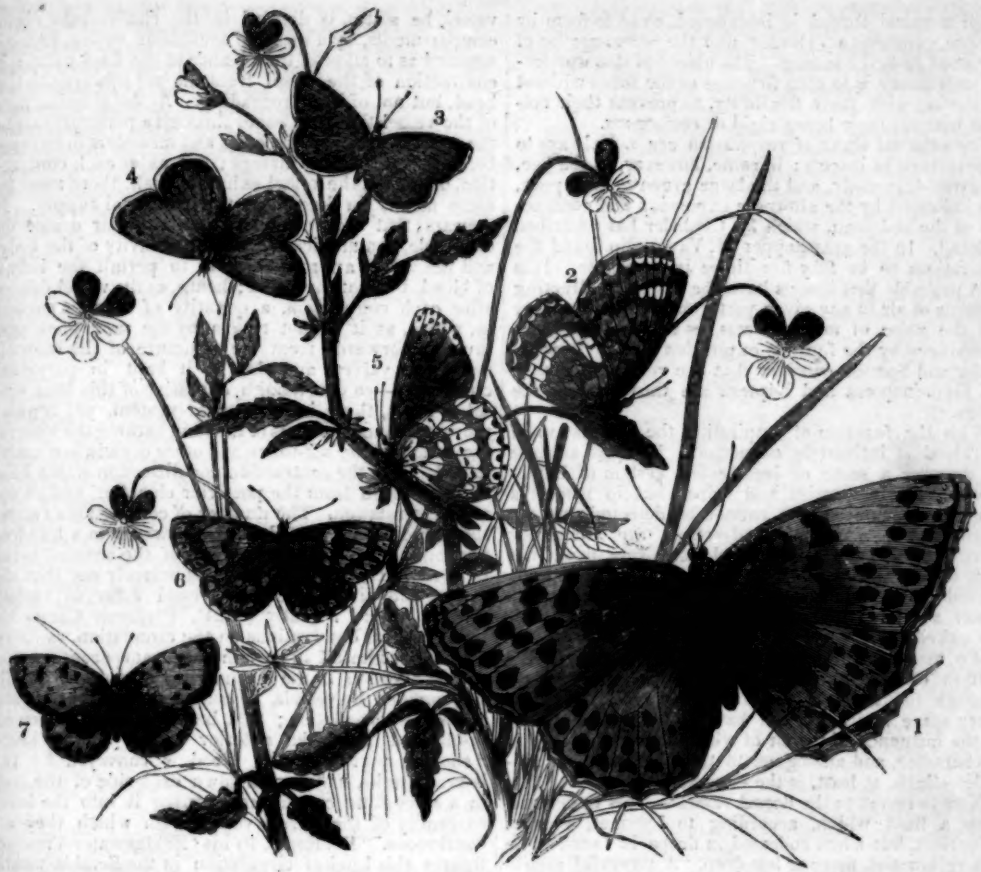


1, Argynnis Paphia; 2, Melitæa Athalia; 3, Polyommatus Argus; 4, Hipparchia Pamphilus; 5, Melitæa Cinxia; 6, Nemeobius Lucina; 7, Lycæna Phlæas.]

CURIOSITIES OF BRITISH NATURAL HISTORY.

Butterflies.—No. III.

In our last paper on the Butterflies of our island we made some observations on their haustellate mouth, the structure of which we endeavoured to explain as succinctly as possible, comparing it with the mandibulate structure of the mouth as exhibited by coleopterous insects. In both instances we showed how the variations in the form and arrangement of the parts composing the mouth, whether those parts be modified into hard jaws or a slender tubular proboscis, were admirably in unison with the nature of the food on which the animal was destined to subsist. But it may be asked—Is the mouth only an organ for receiving and conveying food to the digestive apparatus? Do not insects also breathe through the mouth? and if not, how is respiration performed? Insects do not breathe through the mouth, whether mandibulate or haustellate; respiration is in fact carried on in a manner very different from that which obtains among the vertebrate classes. They have no lungs, like quadrupeds, birds, and reptiles; nor gills, like fishes. Insects breathe through a series of pores disposed in regular succession along the sides of the chest and body. These minute orifices are termed spiracles or stigmata. In many instances these spiracles, which may often be seen with the naked eye, are capable of being closed and opened; in some, however, they are always open and circular; and in numerous insects they are defended by a pencil of hairs in order to prevent the intrusion of dust or other particles. These spiracles generally lead to two main internal branches running longitudinally, and termed Tracheæ, whence multitudes of tubes are given off, dividing and subdividing *ad infinitum*, penetrating every part, and ramifying through all the viscera. These tubes appear generally to be simple, but sometimes assume a beaded appearance, and sometimes numbers of them are dilated at certain intervals into sacculi, or reservoirs, partly perhaps for the preservation of air, and partly, as is the case with the sacculi in birds, to lighten the specific gravity of the body. These tubes, however, are not confined to the body, they are continued into the wings, constituting the nervures, which are in fact air-tubes; and in such insects as fold up the wings, beetles for instance, most naturalists, we believe, consider that it is by forcibly impelling the air into these tubes that the expansion of the wings for flight is effected. Thus then, insects, it may be said, are permeated by air, and to this circumstance their vigour and energy are greatly owing; for every part of their organization and the nutritive fluids are under operation of oxygen; and as fast as the fluids (or blood) become deteriorated, so fast is it renovated.

If the multitude of these air-vessels surprises us, no less does their structure. As far as observation has hitherto gone, the tracheæ at least are found to consist not of a simple membranous tissue forming a cylinder, but of two exquisitely fine membranes, between

which a spiral thread is interposed, so as to form by its close gyrations a cylinder like the worm-spring of wire used in bell-hanging. The object of this wonderful contrivance is to give firmness to the tubes without interfering with their flexibility, to prevent their collapse without their being rigid or coriaceous.

The external signs of respiration are not always to be perceived in insects: in some, however, as the bee, the great dragon-fly, and the large green grasshopper, it is indicated by the alternate expansion and contraction of the abdomen, which M. Chabrier has described in detail. In the grasshopper M. Vauquelin found the inspirations to be fifty-five times in a minute. It is most probable that insects have the power of directing currents of air to any given part; and it would appear that the noise of many insects, as of bees, flies, &c., is produced by the forcible expiration of air. Messrs. Kirby and Spence consider that the vocal spiracles of the Hymenoptera and Diptera are those behind the wings.

With the function of respiration the circulation of the blood is intimately connected. In most animals we discover a more or less perfect system of blood-vessels, namely, arteries and veins; but in insects a complete vascular system cannot be detected: yet we would not assert that blood-vessels are altogether wanting; indeed, a dorsal vessel extending down the back is very apparent, exhibiting a series of pulsations towards the head, and in transparent caterpillars this vessel and its pulsatory movements may be seen with the naked eye.

We may here observe, that the chyle, or nutritive portion of the digested food, appears to percolate through the walls of the alimentary canal, filling up every space internally, and bathing the fine air-tubes, by the influence of the air of which it becomes altered in character, and analogous to the blood of other animals.—Such, at least, is the general theory.

Now to revert to the dorsal vessel:—This vessel contains a fluid which, according to Lyonnet, appears colourless, but when collected in drops is found to be of a yellow tint, more or less deep. A powerful microscope shows it to be filled with globules of inconceivable minuteness; when this fluid is mixed with water, the globules lose their transparency and coagulate in small clammy masses, which after evaporation become hard and brittle, like gum. The nature, then, of this fluid, and the regular pulsation of this vessel, favour the idea of the latter being a kind of heart.

Swammerdam, indeed, asserts that he has seen tubes issuing from this dorsal vessel, which he has succeeded in filling with a coloured fluid; but Cuvier and most writers have stated that it is not only closed at each end, but that there are no tubes leading to it or issuing from it, as is proved by the most elaborate researches. Lyonnet, who traced the nerves and ramifications of the bronchial tubes of nexpressible minuteness, could not, after the most painful investigations, detect either veins or arteries connected with this vessel, but regarded it as open at the anterior end.

Marcel de Serres states that the vessel can be removed without causing the immediate death of the insect; and many physiologists have been inclined to regard it as a secretory organ, but of what kind it was impossible to conjecture. This opinion we think untenable.

According to Meckel, it is furnished with longitudinal muscular fibres; but Strauss Durkheim found it, in the chaffer at least, to consist of an outer membrane and an inner lining of circular muscular fibres.

Strauss Durkheim's description of this dorsal vessel is very curious, and seems in some measure to reconcile the conflicting views which have arisen from the observations of other microscopic anatomists. This vessel, he states, is divided in the chaffer into eight compartments, by a series of semilunar valves, so constructed as to allow of the advance of the fluid upon the contraction of the vessel from the tail upwards to the head, but not of its retrograding. At the anterior part of the vessel the fluid issues through a perforation into the general cavity of the body, and meanders in streams between the various tissues; but as at each contraction, or systole, the vessel exhausts itself, there must be some means for keeping up a continual supply. It appears that each chamber has a valvular orifice on each side, communicating with the cavity of the body, and the valves are so ordered as to permit the influx of blood, but not the efflux; hence, as the vessel dilates after each contraction, a quantity of blood is sucked in, which, as it cannot return by the same openings, must go forwards, from the structure of the internal semilunar valves, and thus is it kept in perpetual circulation—so that though, exclusive of this long vessel or heart, there is no vascular system, yet regular movements and currents of the fluid bathing the viscera, the muscles, the air-tubes and other organs, are maintained. Both the contraction and dilatation of this kind of heart begin from the posterior chamber, and so upwards in rotation. The number of contractions varies; they have been counted at from twenty to a hundred per minute. Such is an outline of the account given by Strauss Durkheim; we need scarcely say that the extent and divisions of this vessel differ in various species. More recently (1824), Professor Carus has published his observations on the circulation, as investigated by himself in certain very transparent insects; and in addition to the meandering streams, evidently not confined by vessels, he considers that there is also a vascular circulation; that besides the main current discharged from the anterior orifice of the heart, "another portion of the blood is conveyed by two lateral trunks, which pass down each side of the body in a serpentine course, and convey it into the lower extremity of the dorsal vessel, with which they are continuous." Dr. Roget, in his 'Bridgewater Treatise,' figures this kind of circulation in the Sembla viridis, from a delineation by Carus, in the 'Acta Acad. Cæs. Leop. Carol. Nat. Cur.,' vol. xv., pt. ii., p. 9. It appears that these lateral vessels give off others, in the form of loops, supplying the antennæ, the tail, the legs, and the wings, which again return the blood to the lateral vessels, and these again merge into the dorsal heart. A similar circulation is asserted to exist in the Ephemera marginata, figured and described in Dr. Goring and Mr. Pritchard's 'Microscopic Illustrations,' and fully detailed and illustrated by an engraving on a large scale by Bowerbank in the 'Entomological Magazine,' i. 239, pl. 2.

In butterflies the circulation is not easily made out, owing to the opacity of their epidermis, and the full covering of hairs, plumes, and scales with which the wings and body are invested. Yet from their activity and alertness, and the vigour of the muscles necessary to the exertions of their fanlike wings, we may reasonably suppose it of as perfect a grade as in most or any insects.

Of these interesting creatures, children of summer, a beautiful group is at the head of this article: we shall give a brief description of them seriatim.

1. The Silver-washed Fritillary (Argynnis Paphia). This beautiful butterfly, sometimes called the Great Fritillary, is generally spread over our island, appearing in June about the sides of woods, and flitting on rapid wings. The upper surface of the wings is of a bright orange-brown, with three rows of black marginal spots, and with several black marks near the centre. The anterior wings are paler beneath, and the hinder wings beneath are brassy green, with four

transverse fasciæ of silvery white. The wings are ample. The caterpillar is solitary, feeding on the wild viola canina, the nettle, &c.: it is tawny, with a yellow dorsal line, and beset with hairy spires; two dark lines run along the sides.

2. The Pearl-bordered Likeness (Melitæa Athalia). This species, also termed the Heath Fritillary, is not uncommon in the more southern parts of England, and in Devonshire. It appears in June, and is found in the open glades of woods, and about heathy commons. It is subject to several variations of colouring, a circumstance which has led to some confusion of names. One variety is the Papilio Pyronia of Hübner. The ordinary colouring is orange above, with undulatory lines of black. The fore-wings beneath are pale yellowish, with a few transverse lines of black at the anterior margin. The hinder wings below, with several black-edged spots near the base, and a curved band of whitish across the centre, and edged with narrow lines of black; the fringed margin of the wing is yellowish. The caterpillar feeds on the plantain and also on the common heath. It is spiny, of a black colour, and spotted with white. To this species is referable the Papilio Maturna of some authors.

3. The Silver-studded Blue Butterfly (Polyommatus Argus), Blue Argus. This elegant little butterfly is not uncommon in the midland and southern districts of England, flitting about in June, over clover fields and ground where the broom grows abundantly, on which herbs the caterpillar feeds. The male and female differ much in colouring, the former having the upper surface of the wings of a deep blue, passing into black round the hinder margin, and bounded by a fringe of white. The wings beneath are bluish grey, with numerous ocellated spots, the hinder wings having on their posterior margin an orange band, containing silvery spots, margined by black crescents. The wings of the female above are of a dull brownish black, the anterior pair having a tawny margin.

The caterpillar is green, with a brown line along the back; oblique marks of brown, edged with white, along the sides; and black head and feet.

4. The small Heath Butterfly (Hipparchia Pamphilus), Golden Heath-Eye.

This species is common throughout the whole of our island, frequenting short-grassed hills, upland pastures, and dry heathy grounds, and appearing in June; a second flight occurs in September.

The wings above are of a pale orange or ochre yellow, with a fringe of long white hairs; underneath, the fore-wings are clouded with ash colour, and have near the tip an ocellated spot of black with a white centre. The hinder wings below are clouded with greenish brown and grey, with two or three indistinct ocellated spots.

The caterpillar is small and greenish, with the back dusky, and a white lateral line. It feeds on various upland grasses.

5. The Glanville Fritillary (Melitæa Cinxia).

On the adjacent continent this species is abundant, appearing in June; but in England it must be considered as of rare occurrence, though it is found in the Isle of Wight, on the hills about Dover, and along those of our southern coast. Its colour above is orange-red, marbled and spotted above with black and yellowish; a row of black points runs parallel with the posterior margin of the hinder wings. The colour of the wings is paler below than above.

The caterpillar is black, dotted with white, and with the head and pro-legs red; it is gregarious in its habits; numbers collect together, and drawing around them the leaves of the plant on which they are feeding, cover the whole with a web of silk: as it is not till late in the autumn that they emerge from the egg, and moreover as they pass through the winter before assuming the pupa state, this habit of clustering together, within a snug tent, is the more requisite. They feed on various plants, as the speedwell, hawkweed, mouse-ear, &c.

6. The Duke of Burgundy Fritillary (Nemeobius Lucina), small Fritillary.

This species is rare in our island, or rather, perhaps, local in its distribution, being chiefly confined to the south-eastern counties, appearing about the middle of May. It is said to be frequent near Cambridge. The wings are dark brown, the anterior pair having three transverse bars of irregular pale yellow spots, the marginal series being dotted in the centre with black. The hinder wings are almost similarly variegated. Underneath the wings are pale brownish yellow, the anterior pair having light spots interspersed with black in the centre, and a row of light spots, with a dusky mark in the centre of each, along the margin; the hinder wings are similarly ornamented, but have two bands of oval spots of a whitish tint, those forming the outer row being edged with black.

The caterpillar is stated to be oval, and depressed in figure, of a pale olive brown, with a black spot on each segment, and with the head and legs ferruginous. It is said to feed on the primrose and cowslip.

7. The common Copper Butterfly (Lycæna Phlœas). In ever part of our island, and on the adjacent continent, this pretty butterfly is tolerably abundant; it extends to Asia, and occurs also in North America. It is light, quick, and active in its movements; and makes its appearance in June, July, and August. The anterior wings, which are not indented at the edge, are of a rich copper colour, spotted with black, and broadly margined with the same. The hinder wings are brownish black, with a copper band posteriorly, spotted along the margin with black. Under surface of the wings paler. This species is subject to considerable variations of colour.

The caterpillar of this butterfly is described as being of a green colour, with a yellow stripe down the back; it is said to feed on the sorrel. it appears to have been but recently ascertained.

We need scarcely observe that the varied colours of the wings of butterflies are produced by the minute plumes or scales with which they are covered, and which, beneath a microscope, present very beautiful objects. These scales are of very different forms, and variously arranged, but mostly in an imbricated style, with more or less regularity. They are inserted into the membrane by a short footstalk or root, but their attachment is comparatively slight, whence they are brushed off by a touch. Not only are they often richly coloured, but they are marked with striæ, and often crossed by finer lines, and these striæ by the reflexion of the light at different angles produce varying tints of brilliant or metallic effulgence. Some idea of the almost endless variety of form and markings which the scales of butterflies and moths assume, may be conceived when we state that Lyonnet nearly fills six quarto plates with crowded delineations of the scales of one species of moth, viz. the Bombyx Cossus. Such is their minuteness, that they appear to the naked eye like a fine powder, and their numbers on the wings of a large butterfly almost defy calculation. Leeuwenhoek counted upwards of 400,000 on the wings of a silk-moth, and it is calculated that in one square inch of surface of a butterfly's wing the number of scales will amount to about 100,740. When these scales are rubbed off, the wings are found to consist of an elastic, transparent, and very thin membrane; and when examined by means of a microscope, it will be found marked with indented lines, exhibiting the arrangement of the scaly covering.

LOCOMOTION OF ANIMALS.—No. VI.

Walking.—By those who have studied the theory of walking, it has been found convenient to divide the time of a step into two portions, namely, that in which one leg, and that in which both legs rest on the ground; at least this arrangement has been adopted by Borelli, Weber, and Bishop. In walking it is necessary that there should be at least one foot always on the ground, and there is no instant in which the body is not supported either by one or both legs. In running, the case is different, as we shall hereafter see.

The period wherein both legs are on the ground is shorter than that in which the trunk is supported by one leg only. During the time the body is supported by one leg the other leg swings from behind forwards; and, being again placed on the ground, the first interval ends, and the other, namely, that in which the body is supported by both legs, begins, and terminates with the raising of the other leg. The time that the body is supported by both legs diminishes continually as the velocity is increased, and when it vanishes altogether, as in quickest walking, we arrive at the common limit of the quickest pace in walking and the slowest in running. Thus the two states in which the body is supported either by one or both legs alternate in such a manner that one begins at the instant the other terminates: and it is found by experiment that only in very slow walking is the time wherein both legs are on the ground equal to half that in which one only supports the body.

We will now endeavour to illustrate the preceding remarks by means of a diagram. In *Fig.* 1, which may be conceived to be a horizontal plane, let us suppose

Fig. 1.

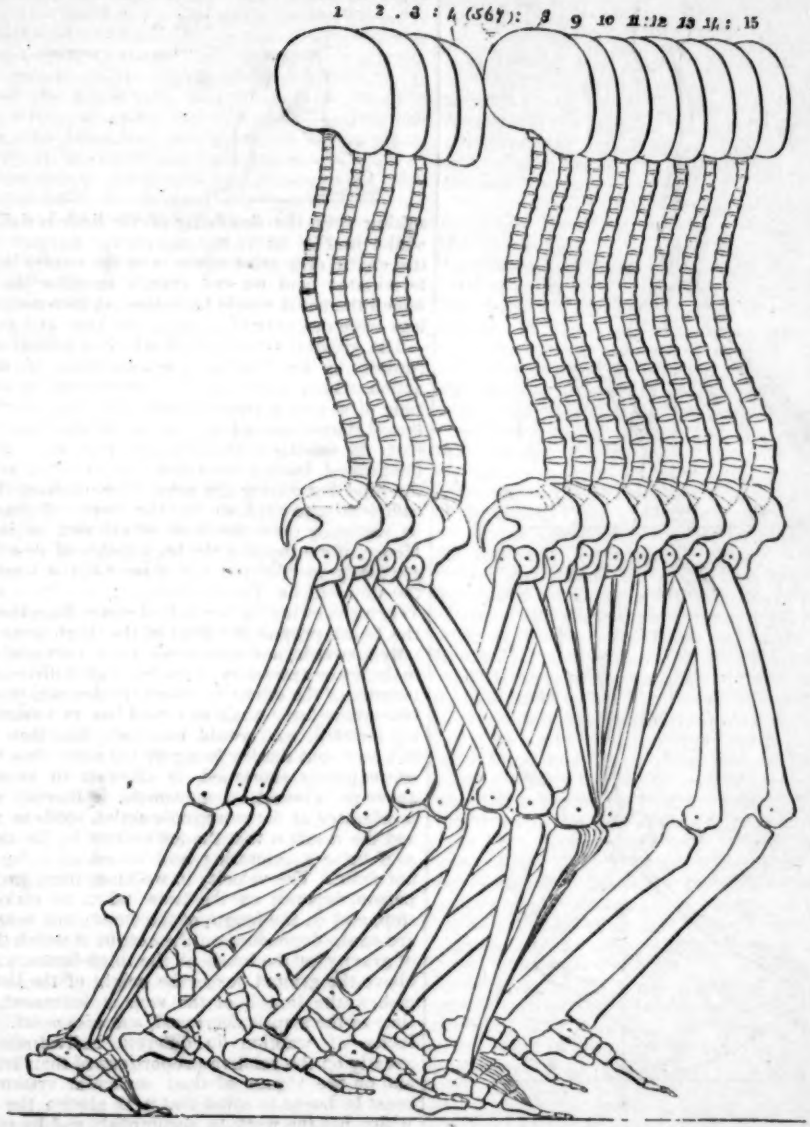
the upper series of lines to represent the left leg, the lower series the right, the straight lines the leg resting on the ground, the curved the leg swinging, and the letters *a*, *b*, &c. to denote the different periods of movement in walking. During *a* both legs are resting on the ground, and at the beginning of *b* the left leg rises from the ground, and swings forward until *c* commences, when both legs are again on the ground. During *d* the right leg in its turn rises and swings from behind forwards, whilst the trunk is supported on the left leg, represented by the upper straight line. At *a'* both legs are again in contact with the earth; at *b'* the left leg again rises in its turn, and swings as before; and thus the two legs alternate their offices in succession. We observe that the period *a*, in which both legs are on the ground, is about half of *b*, during which the left leg is oscillating, and the figure is consequently an illustration of very slow walking, agreeably to what has been already mentioned. It should also be remarked that *b*, the period of swinging, is the middle of the space $\frac{a}{2}$, *b*, $\frac{c}{2}$, which together constitute a single step. In *Fig.* 2 an outline of the human skeleton is represented in twelve positions as designed by Professor Weber, on a scale of one-tenth the natural size of man. The simultaneous relative positions of the head, trunk, and legs are preserved at each of these twelve instants, as viewed through a revolving optical instrument like a stroboscope, which has been adapted for this purpose by Stampfer. By means of this instrument the consecutive positions of the trunk and legs may be taken at very minute intervals of time, a subject of great importance to the sculptor and painter of animals, but which under ordinary circumstances could not be accomplished. In *Fig.* 2 the numbers 1, 2, 3 show the right leg on the ground, and the left leg swinging in advance of it, just before it reaches the earth at the end of the step, seen at number 4. The numbers 5, 6, and 7, which are omitted to prevent confusion, are the successive positions of the two legs resting on the ground before the next step commences with raising the right leg: during this period the centre of gravity moves forward, and the right leg, when raised, is as it were left behind, and is found in the position of number 8. Numbers 9, 10, and 11 show the successive positions of the right leg swinging behind the left; and 12, 13, 14, its positions when it overtakes and passes the left leg, until it reaches the last position, number 1, which corresponds with the number 1 of the other leg, as above described. This excellent figure is necessarily complicated owing to the number of positions depicted; but is easily understood if studied with the attention it deserves.

In very slow walking, the centre of gravity is borne along in a more elevated position than in quick walking; indeed, whatever tends to elevate the centre of gravity, tends also to decrease the velocity of walking; for the length of the hindmost leg, which is nearly the same in all paces, is equal to the square root of the sum of the squares of the height of the centre of gravity from the ground, and of the length of the step; and consequently, the shorter the step, the greater is the height of that centre, and *vice versâ*. This is observable in corpulent persons; and in porters bearing burdens on the head and shoulders; the scientific law being thus confirmed by experience.

In slowest walking, the swinging leg passes through a less curve than in quick walking. In *Fig.* 3 we observe the leg is placed on the ground in advance of the vertical line passing through the head of the thigh-bone; and as a vertical line passing through the centre of gravity falls behind the base of support, the posterior leg cannot be lifted from the ground until the swinging leg has partially swung back again into a vertical position. During this period, both legs being on the ground, the time of the step is a maximum, because the duration of a step consists of the time employed by the swinging leg in describing its curve, and the time wherein both legs are on the ground, both which quantities increase as the velocity diminishes. In this case the straight lines, *a*, *Fig.* 1, have the greatest relative length with respect to the curved lines, *b*.

In quickest walking, the advanced foot reaches the ground in the vertical line which passes through the head of the thigh-bone, as in *Fig.* 4. Here the centre of gravity being entirely supported by the forward leg, the hinder leg is in a condition to rise from the ground the instant the other reaches it, and the time wherein both legs are simultaneously on the ground becomes evanescent. If the joints of the legs did not possess, as we have seen, a considerable freedom of motion, we should not be enabled to vary our speed as we now do; because, as the length of the step increases, the height of the centre of gravity decreases; and to accomplish the latter, the forward leg must be much more bent when it reaches the ground than in slow walking,

Fig. 2.



as seen in *Figs.* 3 and 4, the velocity of the man in *Fig.* 3 being little more than one half of that in *Fig.* 4. It is also in consequence of the power we possess of bending the legs, that we are enabled to move the centre of gravity nearly horizontally; and thereby to move with a much greater velocity than we could do if our limbs were inflexible; for a man with inflexible wooden legs is restricted from walking beyond a velocity within very small limits, however great may be his muscular power. For example, when a man is walking with wooden legs, as in *Fig.* 5, the centre of gravity describes small arcs of a circle, of which each leg is alternately the radius. Now, according to Dr. Young, if the velocity could be sufficiently great to create a centrifugal force exceeding that of gravity, each leg would be raised from the ground immediately after touching it, which would constitute running; for in walking the body is always supported, either by one or two legs; and supposing the inflexible leg to be three feet in length, the centrifugal force would become equal to that of gravity when the velocity in walking became equal to that which a heavy body acquires in falling through half the length of the leg, or one foot and a half, which is very nearly ten feet in a second, or seven miles in an hour. This, then, is the extreme limit of velocity which a man could reach with wooden legs, or with legs whose joints have been rendered useless by disease; but in reality he cannot move with anything like this speed, because he must place his swinging leg on the ground as much before the vertical through his centre of gravity as the other leg is behind it, and therefore his steps must be very short, and taken at a greater mechanical disadvantage than in the slowest walking of ordinary persons. In

Fig. 3.

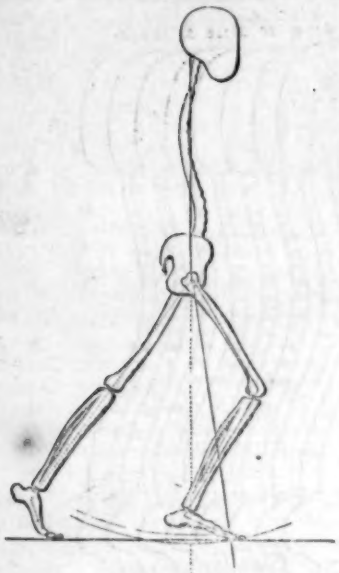


Fig. 4.

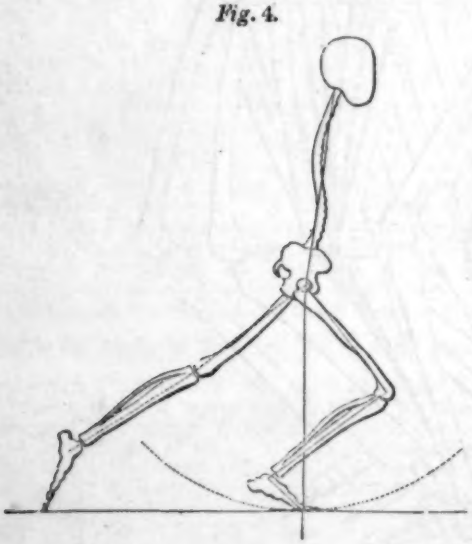


Fig. 5.

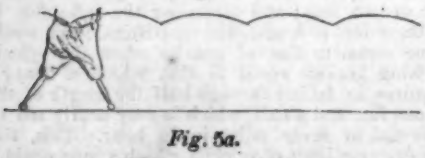
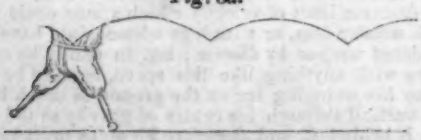
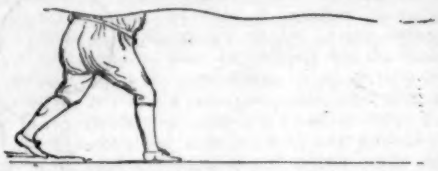


Fig. 5*a*.



consequence of the flexibility of the legs, the path taken by the centre of gravity undulates without forming any abrupt angles during its elevation and depression, as seen in *Fig.* 6, where the actual path re-

Fig. 6.



sulting from the flexibility of the limb is delineated; whilst in *Fig.* 5*a* we see the abrupt manner in which the centre of gravity moves, and the curves begin and terminate; and we can readily imagine the jars to which the trunk would be subject in locomotion, if the legs were destitute of joints at the knee and ankle.

The greatest velocity with which a person can walk (unless by an enormous expenditure of muscular action, which could not be maintained) is when the time of a step is equal to half the duration of the motion of the swinging leg; that is, the time which elapses from the raising of that leg until it is again placed on the ground, having described half its arc of oscillation, the hind leg during the same time pushing the trunk sufficiently forward, so that the centre of gravity may be vertically over the base of support, as in *Fig.* 4. Hence, if we suppose the leg capable of describing its arc freely in ·730 parts of a second, the least time of the step will be ·730 divided by 2, or ·375 of a second. When the swinging leg is first raised from the ground, the trunk propels the head of the thigh-bone horizontally forwards, and communicates a retrograde motion to the lower extremity of the leg, in the direction of the tangent of the curve in which the leg oscillates. This retrograde force tends to retard the movement of the leg forward, and would materially lengthen the time of a step, but the leg being at the same time bent, and consequently shortened, to allow it to swing freely above the ground, its movement is thereby as much accelerated as the retrograde action tends to retard it, and the result is that the leg swings in the same time as if these accelerating and retarding influences did not exist. The velocity in walking, then, in the same person, depends on the time taken in making each step, and on the length of the steps; and both of these are again dependent on the height at which the centre of gravity, or the heads of the thigh-bones, are carried above the ground, for as the height of the latter diminishes, the length of the step is increased, and the time of the step is decreased, and *vice versâ*. The velocity of walking in different individuals depends greatly on the relative proportions of their framework, and on the vigour of their muscular system; but it must be borne in mind that it is always the hind leg which has the work to accomplish, and by throwing it into the required position, and regulating its extension, the speed may be adjusted to the figure of the individual. It is indeed owing to the dimensions of the several organs concerned in locomotion, and to the habit of the individual in applying them, that each person has a step peculiar to himself, so that the very sound produced by the contact of the foot with the ground is sufficient to enable us to recognise the approach of individuals with whom we are familiar, long before we see them. Compared with numerous species of the lower animals, the velocity of man in walking is very inferior. The best constituted persons are incapable of acquiring a speed of little more than five miles in an hour; and even at this rate of motion they are quickly exhausted. Our expenditure of muscular power for the accomplishment of every step is very great, even when walking on a perfectly horizontal

path; but it becomes much greater when ascending inclined surfaces, such as climbing the sides of hills and mountains. Under these circumstances the speed is diminished, and the muscular power is expended in raising the body upwards. During this period, the number of respirations, as well as the number of pulsations of the heart in a second, augments, and a feeling of languor and fatigue communicates to the pedestrian the conviction that he has done as much work as his system will sustain without danger of overfatigue, and too great a prostration of strength—a condition from which it often takes a long time to recruit. On the other hand, a due exercise of muscular action in walking is necessary, as we have already seen, to the healthy and vigorous play of the several organs of the human body.

BARBERS AND SURGEONS.

We are but too apt to overlook the slow and silent operation of the great principles upon which what is now known as the science of political economy are founded, although they are sufficiently curious and obvious, even in matters which might be deemed too high or too low to be thought within their influence. They prevail unconsciously in the progress of society from a low to a high state of civilization; and the painted pole and decayed teeth which formerly designated and ornamented the barber's shop, offer an exemplification of the results of a division and union of employments, interesting enough to justify a short notice of their history.

It is a remarkable fact that the curative art, an art so highly beneficial and even necessary to the well-being of mankind, should for a very lengthened period have existed entirely or chiefly in a merely auxiliary state. Without going into any historical proofs, we may state that in the earliest times it was auxiliary to the priesthood. In the middle ages it was practised by females of the highest classes, and, perhaps as a remnant of these ages in our own country, to a comparatively recent time, few villages were without their Lady Bountiful, who by their simples and specifics alleviated or aggravated, as it might happen, the ailments of the confiding rustics.

The union of the barber with the surgeon is not very distinctly traced. The Egyptian priests, it would appear, shaved, and in the legislation of Moses (*Leviticus*, chap. xiv.) concerning leprosy, the treatment of which disease was intrusted to the priests, he directs, on the recovery of a leper, that the head, eyebrows, and beard should be shaved. This could hardly be done by the patient himself. Civilization, however, gradually rendered the medical an independent, instead of an auxiliary art. Amongst the Greeks and Romans there were eminent medical practitioners; but in the East, where science dawned, but never attained its zenith, the medical profession was, and yet is, commonly united with that of the bath-keeper and the barber. In the middle ages of Europe it again merged into the priesthood, and monks and friars, with a few Jews, the disciples of the Arabians, were the general possessors of the healing art. But here superstition produced the same effect, for a time, that civilization would have more beneficially effected.

In 1163 the Council of Tours prohibited the clergy from performing any operations in which there was loss of blood. Surgery was also banished from the universities, under the pretext that the church held in abhorrence all kinds of bloodshed. This separation was the more readily effected in consequence of the barbers and bath-keepers having assumed the practice of surgery.

In France the Company of Barbers was formed in 1096, when William, then Archbishop of Rouen, prohibited the wearing of the beard. The bath-keepers, who pretended to much medical knowledge, by preparing medicated baths suited to different diseases and constitutions, and also by previously preparing the body by laxatives and venesection, shared with the barbers for a long period the practice of the healing art. Meanwhile the mists of the middle ages were gradually dispersing, and surgery, illumined by the science of anatomy, began its progress towards a new and brilliant position.

The profession of the barber, in the course of time, combined the art of the chirurgeon with the craft of the perruquier. In France the barbiers-chirurgiens were separated from the barbiers-perruquiers in the time of Louis XIV., and made a distinct corporation. The barbers of London were first incorporated by King Edward IV., 1461, and at that time were the only persons who exercised the art of surgery. But this consolidation of the two crafts could not be permanent. The gradual increase of wealth and luxury created a demand for superior skill in every department of medical and surgical science, and the consequence was, that persons of superior attainments began to apply themselves more to actual observation, and the acquisition of practical knowledge by a more careful study of the human body, and surgery was more enriched by the single discoveries of close observers than by all the preceding centuries of theory. These persons formed themselves into a voluntary association which they called the Company of Surgeons of London. The efforts of this association eventually effected the separation of the two crafts. By an Act passed in the 32nd of Henry VIII. these two companies were united and made one body corporate by the name of the Barbers and Surgeons of London, but it is remarkable that this nominal incorporation was their virtual separation, for the barbers were not to practise surgery further than the drawing of teeth, and the surgeons were strictly prohibited from exercising the feat or craft of shaving. This disjunct alliance continued till the year 1745, when, by an Act passed in the 18th of Geo. II., the barbers and surgeons were disunited and made two distinct corporations. Prior to this, however, many of the barbers, notwithstanding the legal prohibition, continued the practice of phlebotomy and the curing of wounds. The lute or guitar, as in former times, formed part of the furniture of the shop, which down to the reign of Queen Anne was frequented by a class of persons somewhat above the common level of the people. The musical instruments were for the entertainment of the customers, and answered the purpose of the newspaper, which in aftertimes became the great attraction of a barber's shop. The barbers for a long period were distinguished by a professional idiosyncrasy, which has been noticed by Steele in one of the papers of the 'Tatler.' In speaking of Salter, commonly called Don Saltero, a noted and eccentric barber, fiddler, and collector of curiosities, he asks, "Whence it should proceed that, of all the lower order, barbers should go further in hitting the ridiculous than any other set of men? Watermen brawl, coblers sing; but why must a barber be for ever a politician, a musician, an anatomist, a poet, and a physician?" But these professional peculiarities gradually disappeared, and the barbers lost caste. In proportion as the profession of the surgeon rose into eminence and renown, that of the barber sunk into insignificance and obscurity. Anterior to this degradation, the two crafts of the barber and the peruke-maker were conjoined, and during the reign of Ann, and subsequently, when periwigs were in vogue, that of the latter was in a flourishing state; but when, by the actual and complete separation of the barbers from the surgeons, the former declined in

importance and respectability, many of the wigmakers relinquished the feat of shaving, and established themselves as perruquiers, hairdressers, and perfumers.

Mr. Creech, in his statistical account of Edinburgh, records a similar revolution in the Society of Barbers, which affords an instance of the rapid progress of refinement, or perhaps the increase of luxury, in the metropolis of Scotland. "In 1763 there was no such profession known as a perfumer; barbers and wigmakers were numerous, and were in the order of decent burgesses: hairdressers were few, and hardly permitted to dress hair on Sundays, and many of them voluntarily declined it. In 1783 perfumers had splendid shops in every principal street. Some of them advertised the keeping of bears, to kill occasionally for greasing ladies' and gentlemen's hair, as superior to any other animal fat. Hairdressers were more than tripled in number, and their busiest day was on Sunday. There was a professor who advertised a hairdressing academy, and gave lectures on that noble and useful art. What is here stated of Edinburgh is, with few exceptions, applicable to London. In 1760 there were in the English metropolis a great number of petty barbers' shops, which in defiance of the laws then existing were open on Sundays, "their busiest day," and to which many persons resorted, not only to be shaved, but to be bled, for which they paid threepence, and frequently had their arms lamed. It was also common at this period for barbers to send their young apprentices into the Fleet, Marshalsea, Bridewell, and other prisons during divine service, to shave the poor prisoners gratis, that they might improve their hands before they practised on their masters' customers. Barbers' men, commonly called flying barbers, were likewise to be seen, even down to a much later period, running about on the Sunday mornings with wig-boxes, containing the newly curled and powdered wigs of those who, possessing only one of these ornamental coverings of the head, could not send them to be dressed until late on Saturday night.

Bleeding, notwithstanding the legal prohibition, continued to be practised by many of the petty barbers till 1780. The shops of these professors presented a mean, dirty, and unsightly appearance; besides the parti-coloured pole* projecting from the door, there was in the lower part of the window a row of porringers, either of pewter or blue and white delf, filled with coagulated blood; while some of the upper panes were adorned with a fanciful arrangement of rotten teeth; and those artists who united to their vocation the art of dressing and renovating wigs, added the sign of an old grizzly peruke stuck on a wooden, featureless block.

Soon after this period, phlebotomy and shaving were completely disunited, and blood-letting, cupping, and the extracting of teeth became a distinct occupation. The bone-setters, another class of practitioners, who occupied themselves solely with the art of replacing dislocated or fractured bones, might now be considered as extinct. Here science had united the profession to that of the surgeon, who had studied anatomy. Wigs, which, from their varieties and general adoption, had for a long time been a source of emolument to the perruquiers, and given employment to a great many petty barbers and their apprentices in weaving of hair, were now going rapidly out of fashion; and their complete extermination, excepting a few instances, and those worn as forensic costume, was effected by the French revolution, which brought into vogue crops and Brutuses. Hair-powder was also going out of use, being relinquished by some to avoid the tax of a guinea per annum, levied on those who wore it; by others, to escape from the ridicule and odium of being pointed at and called *guinea-pigs* and *aristocrats*; and by a third party from political motives.

These changes in the fashions occasioned great distress among the barbers, especially those of the lower class. In 1792 the shops of those whose only employment was shaving and cutting hair were of the meanest description; the pole, which, being no longer indicative of their calling, had been for some time thrown aside, was succeeded by a lantern, about a foot and a half square, made of oiled paper, on which was inscribed, in black or blue letters, "Easy shaving," "Shave for a penny," or "The noted shaving-shop." These lanterns, which were suspended by a string fastened to a wooden or iron rod projecting over the door or window, swung and twirled in the wind, and at night, being illumined by a small candle, emitted a dull, hazy light, distinguishable enough amid the general gloom, which could scarcely be said to be even partially dissipated by the glimmering of the parish lamps.

[To be continued.]

* The barber's pole had its origin in the staff which was usually put into the hand of the patient while under the operation of bleeding; and which, when not in use, had the fillet that bound the arm entwined round it. The painted pole, though of much larger dimensions, represents such staff with its fillet wound spirally round it.

The Kingfisher.—In No. 724 an account was given (from the 'Penny Cyclopædia') of the nest of this bird, and of the different opinions held concerning it. A correspondent, the gardener of a gentleman near Buntingford, in Hertfordshire, evidently an acute and careful observer, has since sent us the result of his investigation, which we give in nearly his own words:—"A pair of kingfishers bred close to my garden last season, and not being so much acquainted with them as I wished to be, I paid particular attention to their habits. Their nest was in a perpendicular bank, ten feet high, of a somewhat sandy soil. They made the hole themselves, which inclined upwards for about three feet, and at the end was a circular hole eight inches in diameter, where they deposited their eggs. I often visited the place, and used to look into the hole, which was not sufficiently large to admit my hand, and was in a very filthy state. Being anxious to get the young, I did not disturb them until I thought they were ready to fly. I then took a garden trowel, and made the hole large enough to admit my hand, taking notice of the passage as I went on. The bottom was covered with fish-bones to the depth of one inch, quite dry. When I reached the end, to my great disappointment, the young birds had flown. Being vexed at losing the birds, and anxious to see them again, I often cast my eyes towards the spot. About ten days afterwards I was gratified to see the old birds begin a fresh hole, which I thought I would not be so tardy in visiting. They made the hole very quickly, using their bills as a picker, and scratching like a rat. I think Montagu is wrong as regards their building in rats' holes, as there were some close by, but they seemed to prefer a hole made by themselves (I say building, but they have not any nest). In a fortnight after the hole was completed, I went and opened it so as to get my hand in, when I found several fish, some whole and others partly eaten. The fish were of the sort called stoneroach, and much too large for the kingfisher to swallow. It has been stated that the birds have never been seen carrying any food in their bills to their young, and that the birds swallow their prey and eject it again. This I believe to be a mistake, as I have frequently seen the birds with their food in their bills, and finding those fish in the hole is a further confirmation of the fact. In this hole I found six eggs, of the same size, shape, and colour as described (in No. 724, *i.e.*, "perfectly white and transparent, of a short oval form, weighing about a dram"). As soon as the old birds found their eggs taken, they immediately began a third hole, four feet from the last. In a few days I visited them again, made the hole large so as to get at them, and here I caught the old bird sitting upon one egg, making seven altogether, as there is little doubt but that this one was part of the number she intended to lay in the second hole. The bird was in a filthy state, as was likewise the hole. Whole fish, in a putrid state, were likewise found here. I do not think any pains were taken in making a nest of the bones, as they were scattered all about the hole alike."